



Florida Power & Light Company, 6501 S. Ocean Drive, Jensen Beach, FL 34957

February 25, 2005

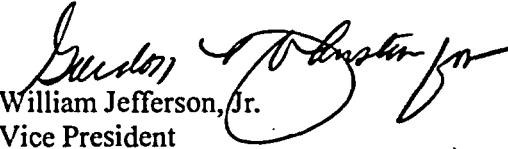
L-2005-043  
10 CFR § 50.73

U. S. Nuclear Regulatory Commission  
Attn: Document Control Desk  
Washington, D. C. 20555

Re: St. Lucie Unit 2  
Docket No. 50-389  
Reportable Event: 2004-005-00  
Date of Event: December 27, 2004  
Manual Reactor Trip Due to Steam Generator Low Level

The attached Licensee Event Report 2004-005 is being submitted pursuant to the requirements of 10 CFR § 50.73 to provide notification of the subject event.

Very truly yours,

  
William Jefferson, Jr.  
Vice President  
St. Lucie Nuclear Plant

WJ/KWF

Attachment

IE22

## LICENSEE EVENT REPORT (LER)

(See reverse for required number of  
digits/characters for each block)

Estimated burden per response to comply with this mandatory collection request: 50 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records and FOIA/Privacy Service Branch (T-5 F52), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by Internet e-mail to [infocollects@nrc.gov](mailto:infocollects@nrc.gov), and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

## 1. FACILITY NAME

St. Lucie Unit 2

## 2. DOCKET NUMBER

05000389

## 3. PAGE

Page 1 of 4

## 4. TITLE

Manual Reactor Trip Due to Steam Generator Low Level

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAME	OPERATING MODE
12	27	2004	2004	005	00	02	25	2005	FACILITY NAME	OPERATING MODE
9. OPERATING MODE  1			11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)							
			<input type="checkbox"/> 20.2201(b)	<input type="checkbox"/> 20.2203(a)(3)(i)	<input type="checkbox"/> 50.73(a)(2)(i)(C)	<input type="checkbox"/> 50.73(a)(2)(vii)				
10. POWER LEVEL  010			<input type="checkbox"/> 20.2201(d)	<input type="checkbox"/> 20.2203(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(viii)(A)				
			<input type="checkbox"/> 20.2203(a)(1)	<input type="checkbox"/> 20.2203(a)(4)	<input type="checkbox"/> 50.73(a)(2)(ii)(B)	<input type="checkbox"/> 50.73(a)(2)(viii)(B)				
			<input type="checkbox"/> 20.2203(a)(2)(i)	<input type="checkbox"/> 50.36(c)(1)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 50.73(a)(2)(ix)(A)				
			<input type="checkbox"/> 20.2203(a)(2)(ii)	<input type="checkbox"/> 50.36(c)(1)(ii)(A)	<input checked="" type="checkbox"/> 50.73(a)(2)(iv)(A)	<input type="checkbox"/> 50.73(a)(2)(x)				
			<input type="checkbox"/> 20.2203(a)(2)(iii)	<input type="checkbox"/> 50.36(c)(2)	<input type="checkbox"/> 50.73(a)(2)(v)(A)	<input type="checkbox"/> 73.71(a)(4)				
			<input type="checkbox"/> 20.2203(a)(2)(iv)	<input type="checkbox"/> 50.46(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(v)(B)	<input type="checkbox"/> 73.71(a)(5)				
			<input type="checkbox"/> 20.2203(a)(2)(v)	<input type="checkbox"/> 50.73(a)(2)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(v)(C)	<input type="checkbox"/> OTHER				
			<input type="checkbox"/> 20.2203(a)(2)(vi)	<input type="checkbox"/> 50.73(a)(2)(i)(B)	<input type="checkbox"/> 50.73(a)(2)(v)(D)	Specify in Abstract below or in NRC Form 366A				

## 12. LICENSEE CONTACT FOR THIS LER

NAME	TELEPHONE NUMBER (include Area Code)
Kenneth W. Frehafer, Licensing Engineer	(772) 467 - 7748

## 13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX
X	SJ	FIC	F120	YES	-	-	-	-	-

## 14. SUPPLEMENTAL REPORT EXPECTED

YES (If yes, complete EXPECTED SUBMISSION DATE).	X	NO	15. EXPECTED SUBMISSION DATE	MONTH	DAY	YEAR

## ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)

On December 27, 2004, Unit 2 was in Mode 1 at 10 percent reactor power preparing to latch the turbine. At 1751 hours, the turbine was latched and the "A" steam generator inventory took a step increase. Approximately 140 seconds following the turbine latch, the 2A main feedwater (MFW) pump automatically tripped on high level in the "A" steam generator. With no MFW pump in service, the "B" steam generator narrow range water level decreased to the low level 40 percent reactor protection system pre-trip on 2 of 4 channels and the operators manually tripped the reactor at 1721 hours. The operators performed standard post-trip actions and stabilized the plant in Mode 3.

The event was caused by a combination of human error and the malfunction of a main feedwater regulating valve controller that allowed the steam generator overfeed condition that ultimately resulted in manual reactor trip due to low steam generator water level. Corrective actions included controller replacement, procedure revisions, and training on the event. The unit was returned to service on January 2, 2005.

LICENSEE EVENT REPORT (LER)  
TEXT CONTINUATION

1. FACILITY NAME	2. DOCKET NUMBER	6. LER NUMBER			3. PAGE
St. Lucie Unit 2	05000389	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	Page 2 of 4
		2004	- 005	- 00	

TEXT (If more space is required, use additional copies of NRC Form 366A) (17)

**Description of the Event**

On December 27, 2004, Unit 2 was in Mode 1 at 10 percent reactor power preparing to latch the turbine. Steam generator inventory was maintained with the 2A MFW pump [EIIS:SJ:P] in service providing flow through the low power feedwater control system (LPFWCS) 15 percent bypass valves LCV-9005 ("A") and LCV-9006 ("B") [EIIS:SJ:LCV]. LIC-9005 was in automatic control and LIC-9006 [EIIS:SJ:LIC] was in manual control. The steam generator inventories were below setpoint but within normal range in anticipation of latching the turbine.

When the turbine was locally latched from front standard at 1716 hours, steam generator "A" inventory took a step increase. Approximately 140 seconds following the turbine latch, the 2A main feedwater (MFW) pump automatically tripped on high level in the "A" steam generator. High steam generator level initiated an automatic turbine trip. Although attempts were made to restart the 2A MFW pump, it was recognized that the attempts would most likely be unsuccessful because the high level in the "A" steam generator was close to the reset point. With no MFW pump in service, the "B" steam generator narrow range water level decreased to the low level 40 percent reactor protection system (RPS) pre-trip on 2 of 4 channels and the operators manually tripped the reactor at 1721 hours.

Operations performed standard post trip actions and the plant was stabilized in Mode 3 with decay heat removal being performed by the auxiliary feedwater (AFW) system and atmospheric dump valves (ADVs). However, main feedwater was available once the "A" steam generator level decreased below the high level reset.

An event response team was formed to investigate the steam generator overfeed event and subsequent low steam generator water level trip. Reactor startup commenced on January 1, 2005 and the unit was brought online on January 2, 2005.

**Cause of the Event**

The event response team identified two significant causes for the steam generator "A" overfeed event and subsequent manual trip on low steam generator level on the "B" steam generator.

The first significant cause for the overfeed of the "A" steam generator was a human error by the failure to follow procedure during post trip activities from the December 25, 2004 manual reactor trip. Plant procedure 2-EOP-99, Appendix X, "Secondary Post Trip Actions," Section 2, requires that a control room operator ensure that both main feedwater regulator valve (MFRV) block valves are closed. However, the MFIV block valves were not closed and there was no requirement that the procedure steps be independently verified. With the MFRV block valves (MV-09-5 and MV-09-6) open, a path exists to feed the steam generators through the MFRVs, FCV-9011 and FCV-9021. FCV-9011 for the "A" steam generator opened due to a controller output malfunction in the automatic mode when the turbine was latched. Regardless, had the MFRV block valves been closed as required by procedure, this event would have been prevented.

The other significant cause for the overfeed of the "A" steam generator was the automatic opening of FCV-9011 [EIIS:SJ:LCV], the "A" MFRV for the "A" steam generator. FIC-9011 [EIIS:SJ:FIC], the controller for the "A" steam generator MFRV, was in the automatic mode. When the operators latched the turbine FIC-9011 provided an open signal to FCV-9011. However, the "A" controller malfunctioned and rapidly positioned FCV-9011 to approximately 25 percent open following the turbine latch.

LICENSEE EVENT REPORT (LER)  
TEXT CONTINUATION

1. FACILITY NAME	2. DOCKET NUMBER	6. LER NUMBER			3. PAGE
St. Lucie Unit 2	05000389	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	Page 3 of 4
		2004	- 005	- 00	

TEXT (If more space is required, use additional copies of NRC Form 366A) (17)

The "A" controller automatic tracking malfunction along with the open "A" steam generator MFRV block valve provided the main feedwater flowpath and subsequent overfeed event on the "A" steam generator. Had the MFRV controller responded as expected or been in the manual mode in hold with zero output, this event could have been prevented.

Contributing causes for the inadequate MFRV configuration control were latent procedure weaknesses and human performance issues during turnover.

The secondary post trip actions of 2-EOP-99, "Appendices/Tables/Figures/Data Sheets," Appendix X correctly configure feedwater for LPFWCS operation by closing both MFRV block valves. However, a latent procedure weakness existed. The operators were not required to take action on the MFRVs because the MFRVs would be in the post turbine trip mode with the controller output grounded (regardless of the selected mode, automatic or manual). This presented a human performance trap for feedwater alignment and challenged operations when the controller remained in the automatic mode and malfunctioned when the turbine was latched.

Procedure 2-GOP-201, "Reactor Plant Startup - Mode 2 to Mode 1," permits steps to be marked N/A based on system configuration control. As such, the configuration is based on other procedures correctly providing the configuration alignment before latching the turbine. This weakness contributed to operating the MFRVs in the automatic mode rather than aligning the MFRVs in manual mode in hold with zero output. Therefore, when the turbine latch removed the controller output ground, the MFRV responded to demands based on steam generator level.

**Analysis of the Event**

This event is reportable under 10 CFR 50.73(a)(2)(iv)(A) as a manual actuation of the RPS.

**Analysis of Safety Significance**

This event was an uncomplicated plant trip and is an analyzed event, so this had no adverse impact on the health and safety of the public. Although the high "A" steam generator level caused the momentary loss of main feedwater and subsequent manual trip based on low level in the "B" steam generator, main feedwater was available once the high level in the "A" steam generator was reset.

The procedural deficiencies identified during this event also existed in the St. Lucie Unit 1 procedures. These St. Lucie Unit 1 latent procedural issues were corrected as part of the corrective actions for this event.

St. Lucie Unit 2 has experienced past issues related to the MFRV controllers during automatic transfer from the LPFWCS to the MFRVs (automatic transfer is unique to Unit 2 LPFWCS) in support of power ascension operations. Given the past history of Unit 2 main feedwater control issues, the feedwater regulating system was scheduled to be completely replaced with a Foxboro digital control system during SL2-16 (spring 2006). However, this event resulted in significant impact just prior to SL2-15 and a new digital modification was completed during the January 2005 St. Lucie Unit 2 SL2-15 refueling outage. As part of the Life Cycle Management (LCM) program, FPL will implement an upgrade to the St. Lucie Unit 2 LPFWCS digital control system during the SL2-16 refueling outage. The LCM program is also upgrading the digital main and LPFWCS feedwater systems for St. Lucie Unit 1 in future refueling outages.

LICENSEE EVENT REPORT (LER)  
TEXT CONTINUATION

1. FACILITY NAME	2. DOCKET NUMBER	6. LER NUMBER			3. PAGE
St. Lucie Unit 2	05000389	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	Page 4 of 4
		2004	- 005	- 00	

TEXT (If more space is required, use additional copies of NRC Form 366A) (17)

**Corrective Actions**

1. To ensure proper alignment of the feedwater system during startups, the St. Lucie Units 1 and 2 plant procedures 1/2-GOP-201, "Reactor Plant Startup - Mode 2 to Mode 1," and 1/2-GOP-502, "Data Sheets Required for Heatup," were revised to require closure of the MFRV block valves and to place the MFRV controllers in the manual mode prior to turbine startup.
2. To ensure that EOP actions are independently verified, Operations Policy 521, "Emergency Operating Procedure Implementation," was revised to require that EOP actions performed by an operator be verified by another operator when conditions permit.
3. To ensure proper alignment of the feedwater system post-shutdown, the St. Lucie Units 1 and 2 plant procedures 1/2-EOP-99, "Appendices/Tables/Figures/Data Sheets," Appendix X will be revised to require that the MFRV controller be placed in the manual mode in hold with zero output during the next EOP update. This action will be completed by August 31, 2005.
4. The Unit 2 "A" MFRV controller FIC-9011 and LIC-9011 were replaced and tested satisfactory prior to Unit 2 return to automatic MFRV control under work order 35000042.
5. A new Foxboro digital main feedwater control system plant modification was implemented during the January 2005 St. Lucie Unit 2 SL2-15 refueling outage under PCM 05002.

**Other Information**

Although not specifically identified as a corrective action for this event, additional digital feedwater system modifications and upgrades had previously been planned as part of the Life Cycle Management (LCM) program. The modifications currently scheduled for the next refueling outage for each unit will further enhance the operation of the FRV's through software integration with the plant's distributed control system as well as provide an improved human/machine interface system for the operators.

**Failed Components Identified**

Equipment: Flow Indicating Controller for Feedwater Regulating System 2A  
Manufacturer: Fischer & Porter Co.  
Model: D200D-3000

**Similar Events**

None